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FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY

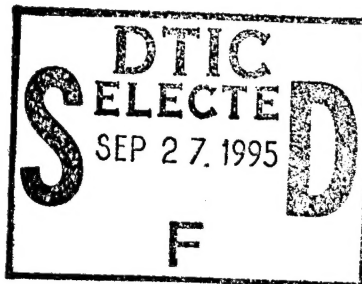
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November 2, 1994

MICHAEL J. JACKSON
Executive Director

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Comptroller

OFFICE OF SCIENTIFIC MEETINGS
AND CONFERENCES
GERI GOODENOUGH
Director



Dr. Joel L. Davis
Scientific Officer Code: 342CN
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Dear Dr. Davis:

Enclosed is the final report to the Department of Navy, Office of Naval Research, for Grant Number N00014-94-1-0701, in support of the FASEB Summer Research Conference, "Biology, Chemistry and Modelling of Vision: Visual Processing," for the budget period May 1, 1994 through September 30, 1994. This report includes the Chairman's Summary, the program, and the list of participants. The financial statement will be sent under separate cover.

The Federation and the scientists who participated in the conference sincerely appreciate the interest and support provided by the Office of Naval Research.

Sincerely,

A handwritten signature in cursive script, appearing to read "M. Jackson".

Michael J. Jackson, Ph.D.
Executive Director

MJJ:afh
enc.

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FINAL REPORT

to the Department of Navy, Office of Naval Research

CONFERENCE GRANT: FASEB Summer Research Conference on
"Biology, Chemistry and Modelling of Vision:
Visual Processing"

GRANT NUMBER: N00014-94-1-0701

PERFORMANCE PERIOD: 5/1/94 through 9/30/94

GRANT AMOUNT: \$5,000

PRINCIPAL INVESTIGATOR: Richard Masland

GRANTEE INSTITUTION: Federation of American Societies for
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DATE OF REPORT: November 2, 1994

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FASEB Summer Conference on
"The Biology, Chemistry and Modeling of Vision"

June 25-30, 1994 - Saxtons River, Vermont

This year's vision conference had 38 invited speakers. Sessions concentrated on:
1) Retinal Cell Populations, 2) Mechanisms of Synaptic Communication, 3) Mechanisms of Lateral Conduction, 4) Parallel Information Flows, 5) Primate Color Vision,
6) Retina-based Hardware, 7) Bipolar Cell Axon Terminals, and 8) The Control of Ganglion Cell Excitation.

The meeting was enlivened by several important break-throughs and interesting controversies. There was an excellent paper by Dr. Enrica Strettoi on the organization of the inner retina. She has found a way to determine finally the densities of the different retinal cell sub-populations. Elio Raviola presented exciting new methods combining molecular biology and anatomy for the study of cell populations. An exciting session organized by Denis Baylor had three presentations on the use of multi-electrode arrays for analyzing the retinal output. The technical part (using multi-electrode arrays) is now solved. The excitement lies in trying to decode the message sent to the brain. Markus Meister gave a particularly stimulating talk, in which he proposed that the action of amacrine cells is indirectly communicated to the brain via the cross-correlation between neighboring retinal ganglion cells.

The folks who study primate color vision are making big progress. The anatomists have reconstructed the pathway from individual color classes of cone to bipolar cells and then to ganglion cells. Although details remain to be solved, the algorithm appears to be in place. With nice symmetry, the electrophysiologists, notably Dennis Dacey, have learned to record from individual ganglion cells in isolated monkey retinas and then inject them with markers. Taken together, these two approaches should unravel the wiring of primate color vision.

Another highlight was a controversy about the activity of amacrine cell dendrites. Amacrine cells remain an enigma. Several groups, however, are succeeding in recording from them. There is some disagreement about whether or not amacrine cell dendrites make action potentials. The meeting was a useful focus for this discussion and left everyone buzzing. By the time of the next meeting, this too will probably be solved.

A number of presentations concerned the channels present in various classes of retinal neuron. Once again, steady progress is being made. Methods for studying single channels are now beginning to be applied in intact retinas. The consequence will be a much better description of the events that control the final retinal ganglion cell output.

The meeting was enthusiastically received and enrollment was 40% above the previous conference. Judging from the responses to this meeting, the next conference may be oversubscribed.

A number of people came from abroad: perhaps a dozen from Europe, a half-dozen from Australia, and about the same number from Japan. The remaining participants came from throughout the United States. There was some bias toward the east coast, but not a great one.

This year the co-chairmen systematically sought to invite younger workers to speak. Approximately one third of the presentations were by scientists aged under 35. This was extremely successful. The younger speakers worked harder at their talks, which were much better than those of the veterans. Having younger speakers also served to make all the younger members of the conference feel more welcome. I hope that this is a tradition that can be continued.

**FASEB Summer Research Conference on the
Biology, Chemistry and Modeling of Vision: Visual Processing**

**Vermont Academy
Saxtons River, Vermont
June 25-30, 1994**

Saturday

REGISTRATION

2:00 - 12:00	Office open for registration
2:30	Bus leaves Logan Airport
5:00	Bus arrives at Vermont Academy
6:00	Dinner

Sunday - 9:00 a.m.

INTRODUCTORY REMARKS

Sunday - 9:30 a.m.- noon

RETINAL CELL POPULATIONS

John Dowling, Chair

David Vaney	Tracer Coupling: Use and Abuse
Enrica Strettoi	The Organization of the Inner Nuclear Layer in the Rabbit Retina
Elio Raviola	Retinal Cell Populations

Sunday - 7:30 p.m.-10:00 p.m.

MECHANISMS OF SYNAPTIC COMMUNICATION

Eric Schwartz, Chair

Eric Schwartz	Transport Mediated Transmitter Release
Fred Rieke	Regulation of Exocytosis in Vertebrate Photoreceptors
Ann Stuart	Histamine: The Neurotransmitter at Sign-Reversing Photoreceptor Synapses in Arthropods
Robert Barlow	Brain Modulation of the Retina

Monday - 9:00 a.m.- noon

MECHANISMS OF LATERAL CONDUCTION

Gordon Fain, Chair

- Paul Cook Change-Sensitive Inhibition in the Amphibian Retina
- Stewart Bloomfield Active Propagation of Synaptic Currents in the Dendritic Arbors of Amacrine Cells and the Formation of Receptive Fields
- Bruce Peters Receptive Field and Voltage Gated Currents of Starburst Amacrine Cells
- Jimmy Zhou Patch-Clamp Recordings from Starburst Amacrine Cells in Rabbit Retinal Slices

Monday - 7:30 p.m.-10:00 p.m.

PARALLEL INFORMATION FLOWS

Denis Baylor, Chair

- Steve DeVries Spatial Sampling by Ganglion Cell Receptive Field Mosaics in Rabbit Retina
- Markus Meister Concerted Signals from the Retina
- Rachel Wong Multicellular Recording of Retinal Neurons Using Calcium Imaging Techniques

Tuesday - 9:00 a.m.- noon

PRIMATE COLOR VISION I

Brian Boycott, Chair

- Gerald Jacobs Photopigments Underlying Primate Color Vision
- Ehud Kaplan The Receptive Field of Primate Ganglion Cells: Space, Time and a Splash of Color
- Christine Curcio Foveal Cones and their Outputs to Ganglion Cells
- Orin Packer Photopigment Transmittance Imaging of the Primate Photoreceptor Mosaic

Tuesday - 7:30 p.m.-10:00 p.m. PRIMATE COLOR VISION II

Heinz Wässle, Chair

- | | |
|---------------|---|
| David Calkins | Circuitry for Spectral Coding in the Primate Fovea |
| Dennis Dacey | Intracellular Responses of Morphologically Identified Ganglion Cells: Evidence for Cone-Type Specific Circuitry in the Inner Retina |
| Paul Martin | Sources of Chromatic Specificity in Primate Retinal Ganglion Cells |

Wednesday - 9:00 a.m.- 12:30 p.m. RETINA-BASED HARDWARE

John Wyatt, Chair

- | | |
|-----------------|---|
| Misha Mahowald | Common Principles in Retinal and Cortical Processing |
| Kwabena Boahen | Speed Sensitivity in a Retinomorph Chip: Modelling Spatiotemporal Behavior of OPL and Neuroanatomy of IPL |
| Andreas Andreou | 48,000 Pixels, 1/2 Million Transistors Contrast Sensitive Silicon Retina |
| Frank Werblin | Physiologically-Based Neuromorphic Retina |
| John Wyatt | Steps Toward the Development of a Silicon Retinal Implant |

Wednesday - 7:00 p.m.-7:30 p.m. BUSINESS MEETING

Wednesday - 7:30 p.m.-10:00 p.m. BIPOLAR CELL AXON TERMINALS

Akimichi Kaneko, Chair

- | | |
|-----------------|--|
| Robert Marc | Local Circuitry of Cyprinid Bipolar Cell Axon Terminals |
| Masao Tachibana | Ca ²⁺ Regulation in the Presynaptic Terminals of Goldfish Retinal Bipolar Cells |
| Gary Matthews | Exocytosis and Endocytosis in Bipolar Cell Synaptic Terminals |

Thursday - 9:00 a.m.-11:30 a.m. CONTROL OF GANGLION CELL EXCITATION

David Copenhagen, Chair

- | | |
|------------------|--|
| Akimichi Kaneko | Fast and Slow Kinetics of Voltage-Dependent Na Channels in X and W cells of the Cat Retina |
| Jeff Diamond | The Relationship Between Light-Evoked Synaptic Excitation and Spiking Behavior of Ganglion Cells |
| Colin Barnstable | Cyclic Nucleotide Gated Cation Channels as Modulators of Ganglion Cell Function |

Thursday

- | | |
|--------------|--|
| 12:00 noon | Bus departs for Logan Airport
(box lunch served on bus) |
| 12:00 - 1:00 | Lunch |
| 2:00 | Office closes |
| 3:00 | Bus arrives at Logan Airport |

POSTERS

There will be two poster sessions. The first will be Sunday and Monday, the second Tuesday and Wednesday. The bar will be moved to the poster area from 4:00 to 6:00 on those days. Posters will be available for viewing throughout each day.

Supported by the National Science Foundation and the Office of Naval Research.

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